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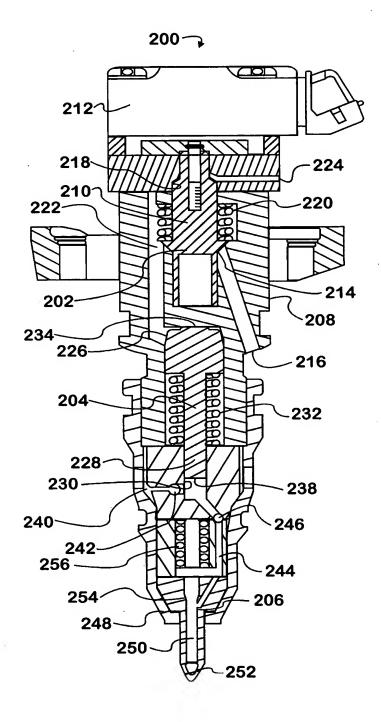
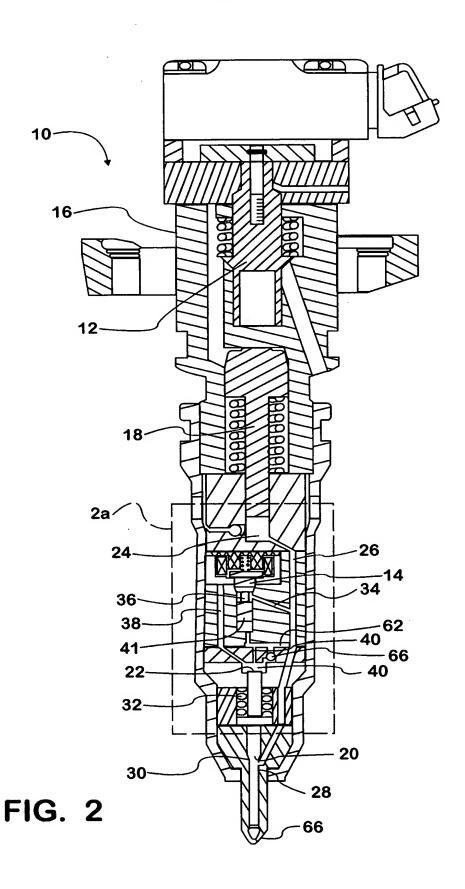


FIG. 1 PRIOR ART

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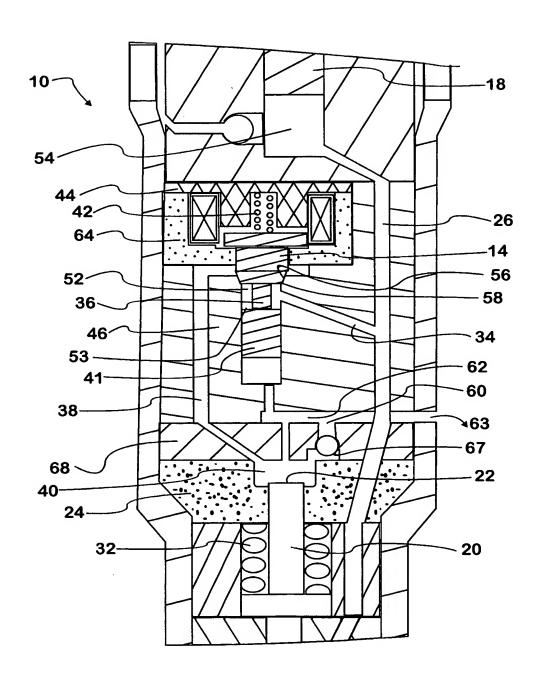


FIG. 2a



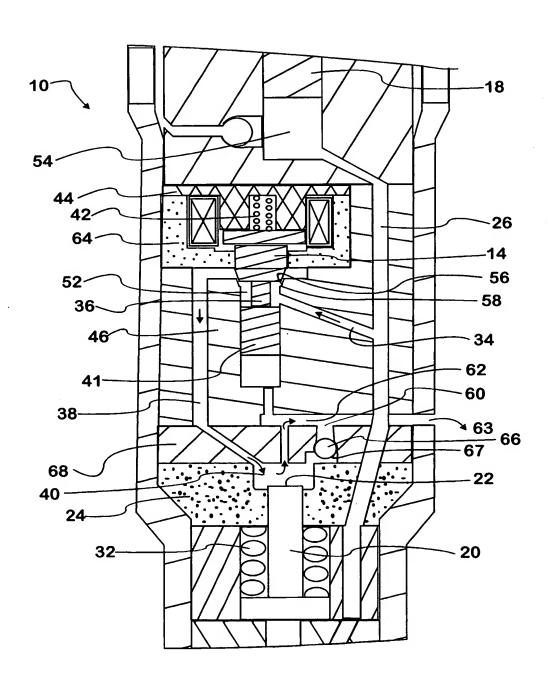


FIG. 2b





CASE 1 TIME

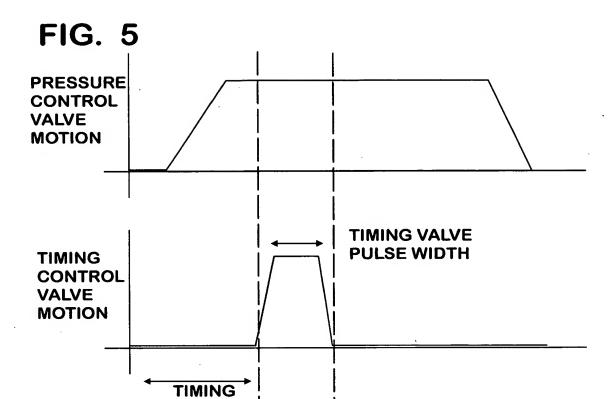
CASE 2 TIME

CASE 3 TIME

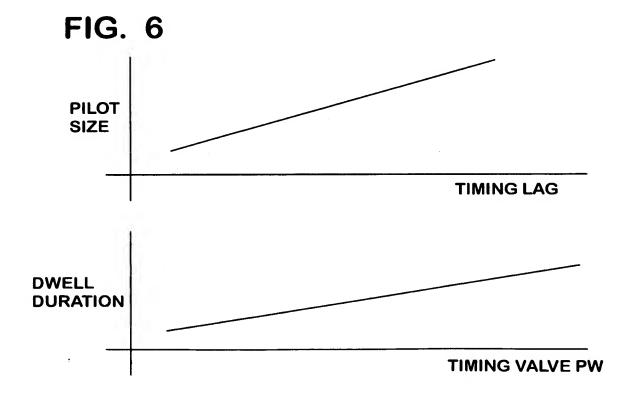
CASE 4 TIME

CASE 5 TIME





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PIEZO CONTROLLED DIRECT NEEDLE ACTUATION

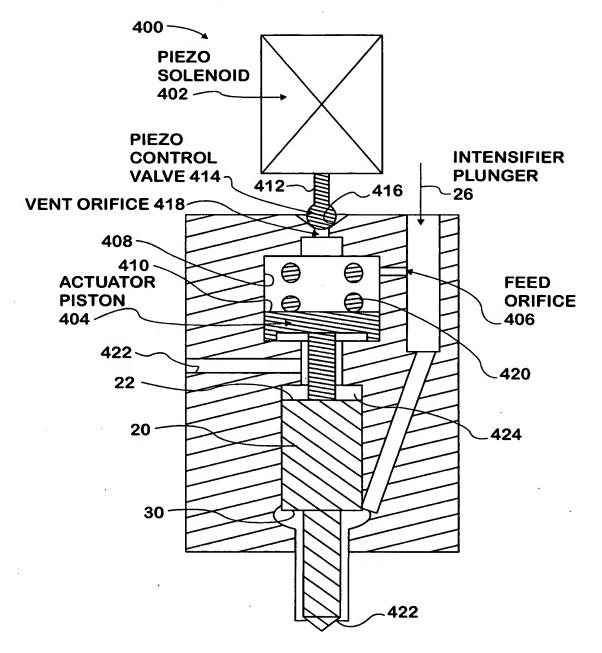


FIG. 7



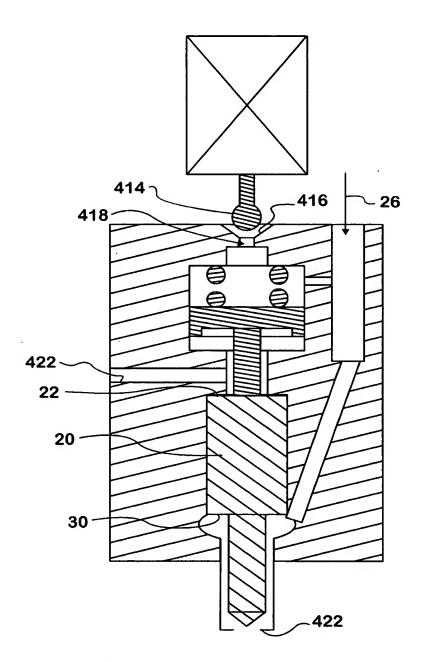


FIG. 8



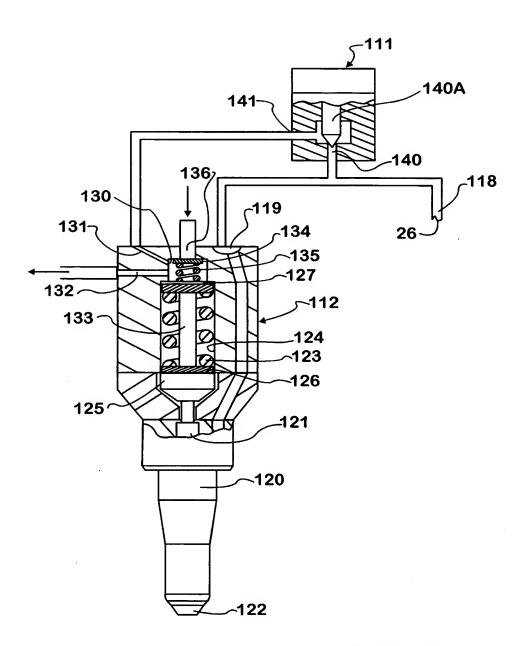


FIG. 9

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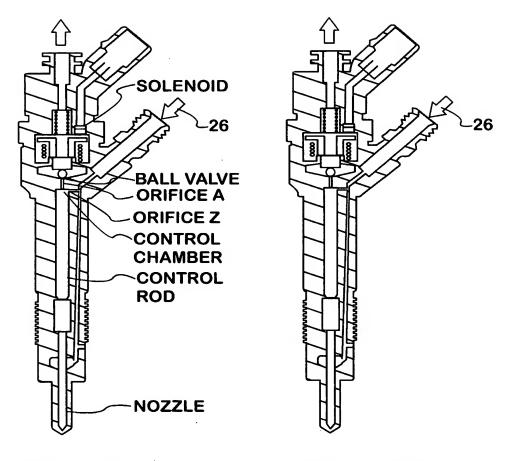


FIG. 10a

FIG. 10b

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